High global demand for mineral commodities has led to increasing application of geophysical technologies to a wide variety of mineral deposits. Co-authored by a university professor and an industry geophysicist, this state-of-the-art overview of geophysical methods provides a careful balance between principles and practice. It takes readers from the basic physical phenomena, through the acquisition and processing of geophysical data, to the creation of subsurface models and their geological interpretation.

- Presents detailed descriptions of all the main geophysical methods, including gravity, magnetic, radiometric, electrical, electromagnetic and seismic methods.
- Explains the cutting-edge current practice in exploration and mining geophysics for the discovery of ‘blind’ mineral deposits.
- Describes techniques in a consistent way and without the use of complex mathematics, enabling easy comparison between the various methods.
- Gives a practical guide to data acquisition, processing and accurate interpretation of geophysical datasets.
- Includes presentation and analysis of new petrophysical data, giving geologists and geophysicists key information on the physical properties of rocks.
- Emphasises extraction of maximum geological information from geophysical data, providing explanations of data modelling, and common interpretation pitfalls.
- Provides examples from all the main types of mineral deposit around the world, giving students exposure to real geophysical data.
- Richly illustrated with over 300 full-colour figures, with access to electronic versions for instructors.

Designed for advanced undergraduate and graduate courses in minerals geoscience and geology, this book is also a valuable reference for geologists and professionals in the mining industry wishing to make greater use of geophysical methods.

**Michael Dentith** is Professor of Geophysics at The University of Western Australia and a research theme leader in the Centre for Exploration Targeting. He has been an active researcher and teacher of university-level applied geophysics and geology for more than 25 years, and he also consults to the minerals industry. Professor Dentith’s research interests include geophysical signatures of mineral deposits (about which he has edited two books), petrophysics and terrain scale analysis of geophysical data for exploration targeting. He is a member of the American Geophysical Union, Australian Society of Exploration Geophysicists, Society of Exploration Geophysicists and Geological Society of Australia.

**Stephen Mudge** has worked as an exploration geophysicist in Australia for more than 35 years, and currently works as a consultant in his own company, Vector Research. He has worked in many parts of the world and has participated in a number of new mineral discoveries. Mr Mudge has a keen interest in data processing techniques for mineral discovery and has produced several publications reporting new developments. He is a member of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists, Australian Society of Exploration Geophysicists, Society of Exploration Geophysicists and European Association of Engineers and Geoscientists.
More and more, great ore deposits are being found under cover and knowledge of exploration geophysics provides a distinct advantage in their discovery. Dentith and Mudge provide a clear, comprehensive, up-to-date, and (very significantly) applied approach for the general geologist, demonstrating how to locate concealed orebodies by employing modern-day geophysical techniques.

Richard J. Goldfarb, Fellow, Society of Economic Geologists

'Readers will really appreciate the up-to-date system descriptions, examples and case histories presented in this new book. In particular, the diagrams in this textbook are superb; the explanatory diagrams have been drawn professionally and the geophysical data and images are shown in full colour.'

Professor Richard Smith, Laurentian University, Ontario, Canada
Geophysics for the Mineral Exploration Geoscientist

Michael Dentith
The University of Western Australia, Perth

Stephen T. Mudge
Vector Research Pty Ltd, Perth
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<td>A Petroleum Geologist’s Guide to Seismic Reflection</td>
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<td>Geophysical Prospecting</td>
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PREFACE

This book is about how geophysics is used in the search for mineral deposits. It has been written with the needs of the mineral exploration geologist in mind and for the geophysicist requiring further information about data interpretation, but also for the mining engineer and other professionals, including managers, who have a need to understand geophysical techniques applied to mineral exploration. Equally we have written for students of geology, geophysics and engineering who plan to enter the minerals industry.

Present and future demands for mineral explorers include deeper exploration, more near-mine exploration and greater use of geophysics in geological mapping. This has resulted in geophysics now lying at the heart of most mineral exploration and mineral mapping programmes. We describe here modern practice in mineral geophysics, but with an emphasis on the geological application of geophysical techniques. Our aim is to provide an understanding of the physical phenomena, the acquisition and manipulation of geophysical data, and their integration and interpretation with other types of data to produce an acceptable geological model of the subsurface. We have deliberately avoided presenting older techniques and practices not used widely today, leaving descriptions of these to earlier texts. It has been our determined intention to provide descriptions in plain language without resorting to mathematical descriptions of complex physics. Only the essential formulae are used to clarify the basis of a geophysical technique or a particular point. Full use has been made of modern software in the descriptions of geophysical data processing, modelling and display techniques. The references cited emphasise those we believe suit the requirements of the exploration geologist.

We have endeavoured to present the key aspects of each geophysical method and its application in the context of modern exploration practice. In so doing, we have summarised the important and relevant results of many people’s work and also included some of our own original work. Key features of the text are the detailed descriptions of petrophysical properties and how these influence the geophysical response, and the descriptions of techniques for obtaining geological information from geophysical data. Real data and numerous real-world examples, from a variety of mineral deposit types and geological environments, are used to demonstrate the principles and concepts described. In some instances we have taken the liberty of reprocessing or interpreting the published data to demonstrate aspects we wish to emphasise.

M.D. has been an active researcher and teacher of university-level geology and applied geophysics for more than 25 years. S.M. has been an active minerals exploration geophysicist and researcher for more than 35 years. We hope this book will be a source of understanding for, in particular, the younger generation of mineral explorers who are required to embrace and assimilate more technologies more rapidly than previous generations, and in times of ever-increasing demand for mineral discoveries.
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Mike Dentith and Stephen Mudge